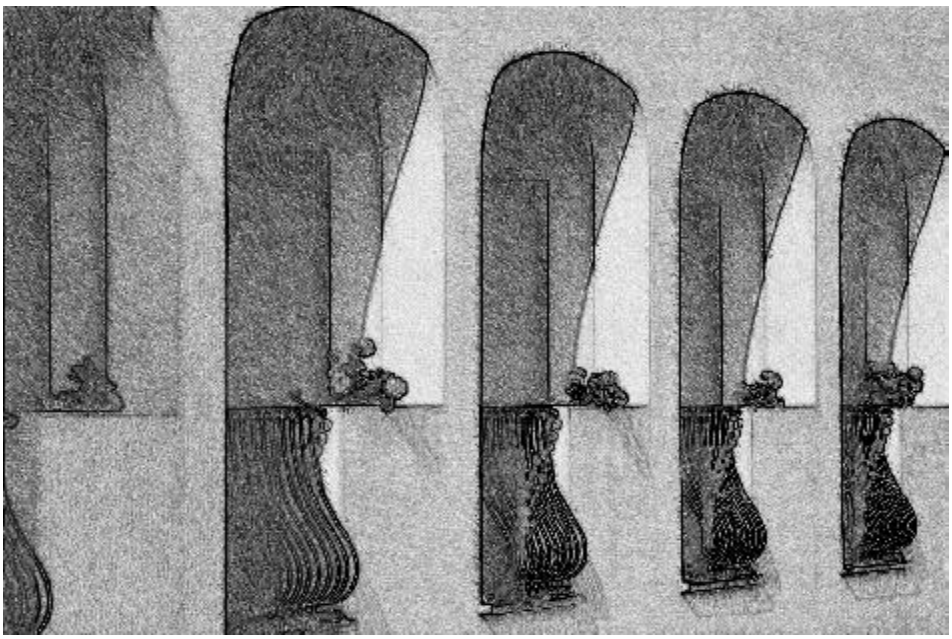

About the theory and empirical analysis of "the persistence of profit" and its applicability to Colombia

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• ***Resumen.*** Este trabajo analiza las aplicaciones de la teoría de la "persistencia en los beneficios" y cómo, ésta, puede ser usada para modelar el comportamiento de la Industria Manufacturera en Colombia. La teoría es interpretada analizando cuales son sus Fuentes conceptuales iniciales, de qué corrientes de análisis económico provienen y qué, y cuáles son los determinantes de los beneficios industriales "por encima de la norma". En este estudio, se propone un modelo para examinar la teoría de la "persistencia en los beneficios" en la Industria Manufacturera en Colombia. Se construye un modelo tomando en cuenta las características de la Industria y las sugerencias de la evidencia empírica.

Palabras Clave: "Persistencia en los beneficios", Monopolios, Estructura de Mercado, Concentración de la firma, Barreras de Entrada, Modelos dinámicos y estáticos, Mobilidad de intraindustria, Modelos de series de tiempo.

• ***Abstract.*** This paper looks into the application of the theory of "the persistence of profits" and how it can be used to model manufacturing industries in Colombia. By explaining where the theory of "persistence of profits" comes from, what it is, and what its determinants are brief descriptions of the theory is given. This paper proposes a model for examining persistence of profits in Colombian manufacturing industry. By analyzing the literature and the modeling in developed countries the model takes into account the characteristics of the manufacturing industry.

Key Words: "Persistence of profits", Monopoly, Market structure, Market share, Firm Concentration Ratio, Barriers to Entry, Static and Dynamic Market Models, Intraindustry Mobility, Time Series Models.

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1. Introduction

This paper looks into the application of the theory of "the persistence of profits" and how it can be used to model manufacturing industries in Colombia. The primary function of this paper is to identify what applications, strengths and weaknesses this theory and modelings have regarding Colombia. Does "persistence of profits" theory need any additions to increase its applicability to a developing country?

The theoretical background is analyzed. This is done by reviewing the appropriate literature and writings on the theory of "persistence of profits", observing what has and has not been written and investigating the available empirical research and models.

The theory of "persistence of profits" is important to look at because it can be used as a framework by industries and individual firms to get better understanding of successful long run profitability and, equally important, some understanding about what can be learned from failures. Profitability is a key variable in economic analysis, not only as evidence of a firm's productivity, but also as a foundation of the economic accumulation process and therefore an important subject of articulation in economic analysis.

2. Theoretical and Empirical insights of the theory of persistence of profits.

This section intends to explain where the theory of "persistence of profits" comes from, what it is, and what its determinants are. It is intended to give a brief description of how it is modeled and what kind of data is used.

2.1 Theoretical background

The "Persistence of profits" theory takes its formal name from Mueller's (1990a) compilation of several studies from different countries. By an international comparison of countries cases and methodologies, this compilation intends to state the main features in the analysis of long run profitability.

Other papers have been written before and after Mueller's [1]. The common denominator in all of them is the fact that they start out by analyzing the process of competition. The process of competition involves the need to study the dynamics of companies' profits, since profits are generated in the process of competition.

When thinking about profits above the norm, it usually leads to think about monopolies. Monopolies are viewed as the antithesis of competition because of the malfunctions and misallocation often attributed to the existence of few buyers or sellers. So, the ideas of monopoly and competition do not match well. But, according to the theory of "persistence of profits" monopolistic attributes are present in many firms and industries not meaning that they are not in perfect competition. This is the reason to find explanations of profits above the norm in some firms and industries.

Under competition, monopolistic elements are supposed to be absent, but in applied studies it has been found that under competition monopolistic elements are present in the form of new products or techniques. "Competition takes the form not of lower prices for an existing set of products but of new improved ideas, and these in turn are property of the individual's who created them and his/her/their employers" (Mueller, 1990a). Competition for a new product is competition for a newly created monopoly. With time, the monopoly disappears as other firms imitate and improve upon the new product. That is why monopolies can be seen as a "passing stage" in an industry evolution and in the competition process.

There are two models of the competition process cited by Mueller (1990a) that take into account monopoly as a passing stage. They have been used in the literature of "persistence of profits" as a framework analysis:

1 Studies like Goddard J.A. and Wilson J.O.S., 1999, Mueller D. 1997.

a. *The static model.* This model comes from Adam Smith's ideologies (1776) and Agustin Cournot (1838). The kind of research derivated from this perspective, states that concentration and profitability are directly correlated, thus the divergence between price and costs is greater in concentrated industries.

b. *The Shumpeterian perspective.* Comes from the ideas of Joseph Shumpeter. The "process of creative destruction". Innovation creating monopoly, monopoly-creating profits, profits creating imitators until a state of normalcy returns, only to be followed by new innovation and a repeat of the cycle. This perspective has had little impact on the formal models of market behavior. It remains as a perspective rather than a model.

Another kind of literature is concerned with the intertemporal variability of profit rates in response to business cycle factors. Such studies have predicted changes in profit rates or price cost margins over the business cycle, with these changes being related to industry characteristics such as concentration and capital intensity.

2.2 Determinants of the persistence of profits

Several variables have been stated as the determinants of long run profitability. Some of these variables are market structure (industry characteristics), market share, market share growth, productivity, firm concentration ratio, replacement value capital stock and growth of the firm. Other variables are more difficult to measure, but are equally important. Some of the latter ones are barriers to entry, stock of advertising, stock of research and development and minimum efficient size measure.

2.3 Empirical background

Some studies have been done for different countries. Their main characteristic is the fact that they are applied works on industrial or developed countries. Some of them are: The United States, Canada, Germany, France, Italy, Japan and United Kingdom[2].

Two kinds of modeling procedures are found in the literature:

i. Static and dynamic market models

Is a cross sectional analyses of the variation in profits across industries to examine long run equilibrium positions. Most of these regressions are as follows: $\pi_i\rho = \chi_i\beta + \mu_i$.

2 Cubbin J. and Geroski P. (1990). Geroski P. and Mueller D. (1990) Hiroyuki O. and Hideki Y. Mueller D. (1990). Shyam K. and Shapiro D. (1990) Yves F. and Weber.

Where π is the equilibrium (permanent) level of return of some firm *i* (or the return in average in some industry when working in comparing industries), the values of the explanatory variables (market share, advertising, concentration, etc) will be described by the vector χ with the unknown parameter β and μ will be the error. The estimation of this unknown parameter β is to make inference about market share or industry concentration. The ultimate goal is to analyze the existence of monopolistic resource misallocation.

The flaws of this kind of models are: it neglects market dynamics, leading to incorrect inferences about the association between market structure and performance. They do not contain enough information to formulate policy recommendations.

ii. Time series analysis

Time series analysis describes the response of entry, exit, or intraindustry mobility to deviations of current return from their long run equilibrium levels. In turn, time series analyses; trace the effects of entry on subsequent industry performance. Then, by taking the level of excess profits $\rho(\tau) \equiv \pi(\tau) - \pi\,\rho(\tau)$, time series models can divide the forces inducing changes in profits into two types: systematic factors (entries) E(t), and all other factors that are referred to as "luck" or exogenous factors u(t). Entry is the outcome of decisions made by market participants and is a consequence of high profits. Entry can cause changes in profits by altering industry pricing conduct and causing changes in the form and intensity of nonprice conduct (i.e. advertising) (Mueller, 1997). Then, the net effect of these forces is: $\Delta\rho(\tau) = \theta_0 + \gamma_0\ E(\tau) + \gamma_1\rho(\tau-1) + \mu(\tau)$; where $\gamma_0<0$; $\gamma_1<0$, and $\Delta\rho(\tau) = \rho(\tau) - \rho(\tau-1)$. The term γ_0 summarizes the effect that entry has on $\rho(\tau)$ as entrants bid away excess returns and θ_0 is the permanent advantage enjoyed by the firm. It is a simple reduced form description of the movements of the profits earned by the firm over time (auto regression in profits).

2.4 Data used

There is a big debate about the data used in these kinds of models: accounting versus economic returns.

Many studies have used accounting data[3]; they have been criticized for deficiencies when analyzing economic performance or its determinants. One of the critics is the fact that accounting returns may deviate from true economic returns by large magnitudes (Fisher, 1983 cited in Jaramillo, 2000). Some writers state that the market value of a

3 See... Cubbin J. and Geroski P., Geroski P. and Mueller D., Goddard J.A. and Wilson J.O.S., 1999., Hiroyuki O. and Hideki

firm is actually a better measure of economic performance. The argument that the market value of the firm is superior to accounting profits is based on the facts that dividends and interest are paid out of economic profits not accounting profits and the securities market can accurately predict future economic profits. Besides the market value of a firm, the variables most used as a measure of profits have been: Lerner index, returns excess and Q of Tobin.

This is a brief history and explanation of where the theory of "persistence of profits" comes from and how it can be modeled. The great majority of cases indicate that it is a pertinent study for developed countries; but it is challenging to figuring out how it can be applied to industries in developing countries.

3. Applicability of the "persistence of profits" analysis to Colombian manufacturing industry.

This section aims to characterize the manufacturing industry in Colombia in order to be able to suggest and describe an appropriate and applicable model of "persistence of profits".

3.1 Colombian manufacturing industry analysis.

Historically, during the 70's up until the early 90's the manufacturing industry has represented about 22% of Colombia's GDP composition, one of the largest among industries. After 1991 its participation in GDP fell (13.8% in 2002) but it is still one of the sectors with more participation on economic growth [4]. The recession after 1991 in this industry can be explained by macroeconomic factors. This is a coincident cyclical industry with respect to the GDP or economic growth; this means, it goes up and down together with the whole economy.

The most representative activity within the industry is the food sector with a contribution greater than 20%, it is followed by textiles 7% and chemical products 6.1%. Manufacturing industry in Colombia is the main source of employment in the economy; it has 7863 firms with more than 10 workers. Food industry, Chemicals, machinery and textiles together generate about 60% of industrial employment and almost 20% of total employment. Direct investment to this industry comes from the United States (25.9%), Panama (16.2%) the Cayman Islands (11.4%) and Europe (20%). Most exports from the industry have gone to The United States (29%) followed by the Andean Community (30% combined) then Mexico, and Chile.

4 Data obtained from DANE (Departamento Nacional de Estadisticas), organization in charged of National Statistics and surveys.

Three factors have been stated as the reasons for variations in profits within the manufacturing industry (Escobar, 2000 & Jaramillo 2002). The first is the industry itself; market concentration can explain why Colombia manufacturing firms have been successfully better than others in the market. The second explanation of profits in this industry is the size of firms and market share; Colombian manufacturing industry has small and medium size enterprises that are profitable, especially in sectors like beverages, tobacco and other food products where concentration is the key for success. More industrialized sectors have larger firms, especially in auto parts, capital goods production and chemicals. The third factor, which is an important determinant of the growth of the manufacturing industry, is the net entry of new firms that help to augment the concentration forces up instead of driving profits to zero [5]. Another reason recognized of the good performance is the administrative strategies. The manufacturing industry has been characterized as having good managers and CEO's.

3.2 Modeling the "persistence of profits" in manufacturing Colombian industry.

As a variable measuring profits, it is proposed to work with two:

1. The Assets return rate or ROA, which is = Operational Utility / (Total Assets – Other Assets). This is a variable that firms in Colombia calculate and give to Superintendencia de Sociedades, so it will provide uniformity when running the models.
2. After tax profit rate plus interest divided by total assets. Researchers frequently use this because it reduces the problems associated with variations on the ratio (debt \total assets) and it is convenient to calculate.

a. The model

This section proposes a new model to analyze the manufacturing industry in Colombia, based on other countries experiences. Here it is important to note that the availability of data and the characteristics of the industry will determine the structure of this model.

From the models for "persistence of profits" there are a few that fit to the Colombian manufacturing industry. The main reason is the fact that they are made and applied to developed countries and these countries characteristics are quite different from Colombia. Nonetheless, there are remarkable characteristics that can be used.

The literature review provides some of the models that can be used, Table 1 in the appendix shows some of the models studied and analyzed for this research. The

5 There is a plenty of coordination between firms that get together and make "alliances"

main differences found in the literature were that some of the papers have been done for particular sectors or industries for a particular country, and others models are for firms. The principal difficulty examining the competitive process is that the dynamic forces to which firms must adapt are difficult to observe, and, indeed many of them are unobservable.

There are some clear aspects: The majority of these models try to capture the persistence of profits in the long run, they aim to describe the behavior in terms of duration of above the norm profitability. They use accounting data for measuring profits (see Table #1 for all the measures proposed).

There are just a few models like the one proposed by Jaramillo (2000) and Shyam K. & Shapiro D (1990) that take into account some explicative variables of long run profitability instead of (just) measuring how persistent profits are over time.

The model proposed for the Colombian manufacturing industry is based on what the literature has proposed. It evaluates the persistence of profits over time but also explains why? It is a time series (autoregressive) model, which presents properties that involve the assumptions that characterize the Colombian manufacturing industry, this is:

$$\mathbf{r(t)_i = a + lp_{it-1} + b_i + f_j + d_t + W_{jt} + e_{ijt}} \qquad (1)$$

$$\mathbf{i = 1,2..... 998.}$$

Where p (t) = π(t) - π(t)average. This is as proposed by Geroski, P. & Jaquemin A. (1988). This is defined in such a way to recognize which firm has had profitability above the average. p(t) > 0 will indicate a successful firm and p(t) < 0 an unsuccessful one. This allows assumption (iii) to hold; in absence of entry barriers, if π(t)average > 0 it should provide an incentive to entry while if π(t)average < 0 it provides no incentive to entry.

The constant α explains what isn't explained by the variables in the model, it can also be viewed as the effect of "luck" on p(t).

$\lambda\pi_{it-1}$ captures the persistence of profits in the long run and (1- λ) represents the speed of profit adjustment parameter as proposed by Shyam K. and Shapiro D (1990), Schwalbach J. and Mahmood (1990), Yves F. and Weber A. (1990), Hiroyuki O. and Hideki (1990a) and Kessides I. (1990).

β_i is the "firm effect" contribution as proposed by Jaramillo (2000). This variable will retain assumption (ii), which is the hypothesis that the administrative management is a good explanatory variable of the industry success. ϕ_j will be the sector effect, explaining the role of the industry concentration on the industry's success.

δ_t, W_{jt} will explain the macroeconomic effects on the firms of the industry. This goes with assumption (iv). It is important to know how macroeconomic effects affect the industry.

ε_{ijt} Is the error effect (random variable).

b. Applications, weaknesses and strengths.

"Persistence of profits" has been applied mostly to developed countries. There is not enough empirical evidence about developing countries. The case of some developing countries is important because there are some long run profitable firms and industries such as the case of the manufacturing industry in Colombia.

The model proposed is applicable to Colombian manufacturing industry, it involves basic assumptions about the industry and permits an evaluation of how persistent profits are, but also allows an explanation of why they are persistent.

There are other variables that explain industry behavior but they are not involved in the model proposed for simplicity. A few simple variables are better to get an understanding that can be used later in new models and evaluations.

4. Conclusions

The case of Colombia has not been broadly studied. The theory of persistence of profits has been applied mainly toward industrialized developed countries. The literature in less developed and developing countries is minimal.

This paper proposes a model for examining persistence of profits in Colombian manufacturing industry. By analyzing the literature and the modeling in developed countries I was able to build and propose a new model that takes into account the characteristics of the manufacturing industry.

To evaluate persistence of profits it is important to state the existent relationships between market structure and industry profits. Profits in a particular firm can be interpreted according to the industry in which they belong.

This subject is important and relevant because it allows analyzing and proposing corrective measures for new industries based on what successful industries have done. A successful firm is one that can regularly produce the "correct" reply to various exogenous changes in its environment, and, at the same time, cope with the endogenous changes that are induced by its own success. The extent to which profit persist above the norm depends on how successfully firms overcome the challenges posed by the need to adapt to the environment. Knowing how successful firms work will give suggestions for other firm's strategies.

The main achievement of this paper was to propose a model that takes important assumptions of the manufacturing industry into consideration. These assumptions are extracted from previous studies as well as from manufacturing industry history. This way, administrative factors, market concentration; entry of new firms and macroeconomic behavior will reveal how important they are explaining success.

References

Cubbin J. and Geroski P. The persistence of profits in United Kingdom. The dynamic of profits. An international comparison, Cambridge University Press, 1990.

Escobar H.J., 2000. "Industria manufacturera y crecimiento economico nacional".

Borradores semanales de Economia, No.110. Banco de la Republica.

DANE, Departamento Nacional De Estadicticas. www.dane.gov.co

Geroski P. and Mueller D. The persistence of profits in perspective. The dynamic of profits. An international comparison, Cambridge University Press, 1990.

Geroski P. Modelling persistent profitability. The dynamic of profits. An international comparison, Cambridge University Press, 1990.

Geroski, P. & Jaquemin A. 1988. "The persistence of profits: An European Comparison". The EconomicJournal, Vol 98, Issue 391

Goddard J.A. and Wilson J.O.S., 1999. :The persistence of profit: a new empirical interpretation." International Journal of Industrial Organization. 17, pp. 663-687.

Hiroyuki O. and Hideki Y. The persistence of profits in Japan. The dynamic of profits. An international comparison, Cambridge University Press, 1990a.

Hiroyuki O. and Hideki Y. The persistence of profits: international comparison. Thedynamic of profits. An international comparison, Cambridge University Press, 1990b.

Jaramillo A. y Angel A. 2002. "Analisis de Varianza de los Beneficios de las empresas manufactureras en Colombia, 1995 - 2000" Working Paper: Grupo de Estudios en Economia y Empresa. Universidad Eafit.

Kessides I. The persistence of profits in U.S. manufacturing industries. The dynamic of profits. An international comparison, Cambridge University Press, 1990.

Mueller D. 1997. "The persistence of profits above the Norm". Economica, New Series, Volume 44, 176, pp. 369-380.

Mueller D. Profits and the process of competition. The dynamic of profits. An international comparison, Cambridge University Press, 1990 a.

Mueller D. The persistence of profits in the United States. The dynamic of profits. An international comparison, Cambridge University Press, 1990 b.

Revista Semana, #111, 2002. Bogota, Colombia.

Schwalbach J. and Mahmood T. The persistence of corporate profits in the Federal Republic of Germany. The dynamic of profits. An international comparison, Cambridge University Press, 1990.

Shyam K. and Shapiro D. The persistence of profits in Canada. The dynamic of profits. An international comparison, Cambridge University Press, 1990.

Yves F. and Weber A. The persistence of profits in France. The dynamic of profits. An international comparison, Cambridge University Press, 1990.

Appendix

Table 1

Author	Model	Characteristics	Dependent variable	Conclusions
Jarastitle, 2002	[illegible]	[illegible]	[illegible]	[illegible]
Geroski, P. & Jaquemin A. 1988	An individual firm model with a specific scale: $x(t) = \alpha(t)x_{t-1} + \beta(t)$ $\alpha(t)$=a function of firm's size $x(t)$ for the successful $x(t) = \alpha + \sum_{j=1}^{k} \beta_j x_{t-j} + \varepsilon(t)$ This is compared to the economy in general	This is a check to get a solution to the problem of assessing the persistence of profits when all the factors a source currently a α= Effect of the long run $\alpha(t)$ β Equals the sum of the coefficients on profitability $\varepsilon(t)$= Assumes that long run equilibrium of the economy is sensible $u(t)$= Random variable	Accounting data Profits are measured as accounting rates of return on total assets before taxes. $p(t)$ is the difference between the profitability of a firm and the country sample mean rate of profit for the year	The important point to note in this model is the ability to observe the competitive actions which affect firms over time and against which they must struggle to continue enjoy success
1. Goddard J.A. and Wilson J.O.S., 1999. **2. Cubbin J. and Geroski P. 1990**	Stochastic approach modeling profitability as an autoregressive process $\pi_{it} = \alpha_i(1-\rho_i) + \rho_i \pi_{it-1} + \mu_{it}$ Time series panel data	For a suitably standardized profit rate from firm i in year t α_i are vectors of interest that describe the data generating process for p	Profit as Jatiner uses net profit after tax plus interest payment divided by total assets	Conclusions: [illegible]
Hiroyuki O. and Hideki Y 1990a	Autoregressive equation in time series data $r_t = \alpha + \lambda r_{t-1} + \mu_t$	K is the long run projected profit in the industry λ is the speed of profit adjustment to expectations shocks	Profits is measured as net after tax profit plus interest divided by total assets	Profits are persistent in the long run for most of the sectors and countries. Does not exist in other sectors
1. Shyam K. and Shapiro D 1990 **2. Schwalbach J. and Mahmood 1990** **3. Yoo E. and Weber A. 1990** **4. Hiroyuki O. and Hideki 1990a** **5. Kessides I. 1990**	Autoregressive time series data $\pi_{it} = \alpha + \lambda \pi_{it-1} + \mu_t$	λ captures the persistence of profits in the long run $(1-\lambda)$ represents the speed of profit adjustment parameter	1. π_{it} = rate of effective profits plus interest payments divided total assets net and gross of taxes 2. Tobin's Q 3. Rate of return measured by profits plus interest payments divided total assets 5. Ratio of value added minus payroll to total sales	1. Describes behavior in two particular industries 2. Describes behavior in Germany manufacturing firms 3 Describes behavior in Korea firms listed on the stock exchange. 4 Describes behavior in Japanese firms.